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Citrus Insect Control For
September, 1956

Present Status of The Push
And Treat Program For
Controlling Spreading
Decline

A Pathologist Visits
Valencia

Reaching New Horizons
For Florida Citrus

Preventing Planting Losses
In Citrus Trees

Half A Century Of Citrus
Production Research

Florida State Horticultural
Society To Hold Annual
Meet, Nov. 7-9

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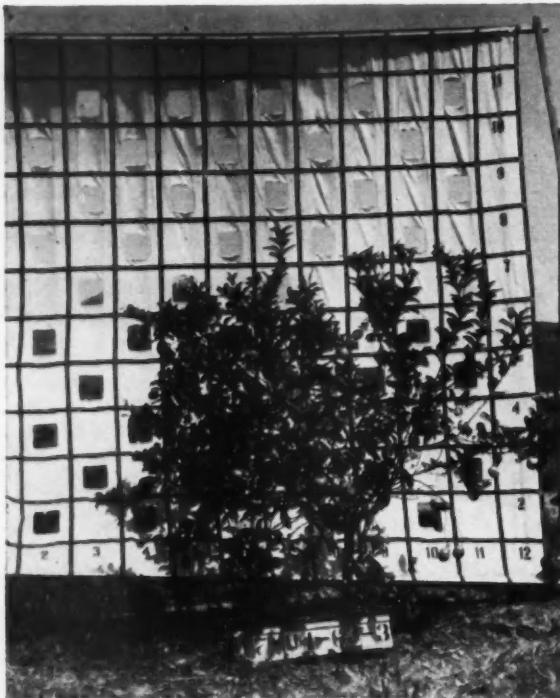
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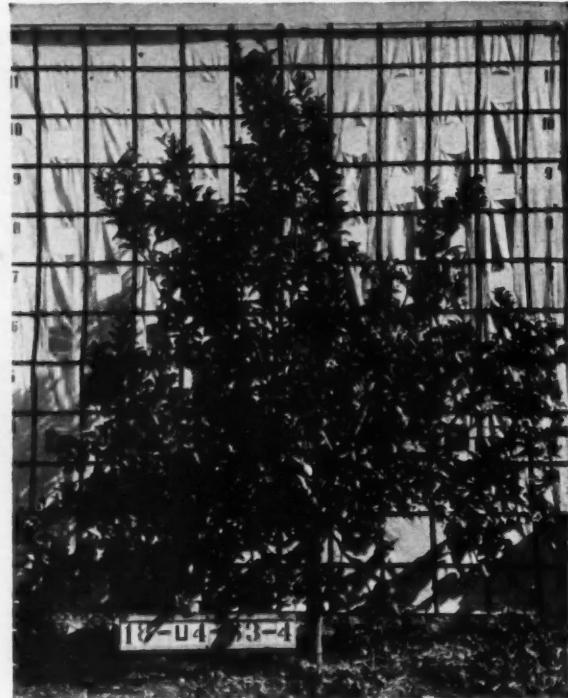
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R. M. Pratt

Citrus Insect Control



R. B. Johnson

For September
1956

R. B. JOHNSON*
R. M. PRATT
W. L. THOMPSON,
Florida Citrus Experiment
Station, Lake Alfred



W. L. Thompson

Red scale activity increased during August from an already high level and hatching was proceeding actively at the end of the month. There will be a declining trend during most of September, but there is every indication that activity will start increasing at the end of the month and that RED SCALE INFESTATIONS WILL BE HEAVY IN MANY GROVES IN OCTOBER AND NOVEMBER.

Purple scale activity declined sharply in August. The declining trend will continue until mid-September, after which there will be a slowly increasing trend continuing into November. The average infestation will be low in the fall months.

Purple mite activity was generally low in August and the average population is now down to a normal level for late August. There will be some increase in activity late in September but the average infestation will be low.

Rust mite infestations reached a peak at record high levels in mid-August, with fruit infestations being especially heavy. The level will be high through September with a new increasing trend starting late in the month.

SPRAY PROGRAM

September is an excellent time to check groves for pest infestations because summer scalicide spraying is usually nearly finished. In other words, we usually have a slack period in September between application of summer scalicides and fall mite spraying when we can check groves to see what has been accomplished and to get an idea of what will be required later. This year, however, because of prolonged dry weather, scalicides are still being applied. Nevertheless, wherever possible, groves should be checked carefully for scale and mite infestations.

Red scale is expected to be more

of a problem this fall than purple scale, especially in groves sprayed early in the summer. It is highly advisable to check for possible outbreaks of this pest because it can cause severe leaf drop and consequent dead wood in a very short time. In looking for red scale, remember that this pest is rarely evenly distributed. It usually occurs in parts

Scale Control: The use of oil emulsion for control of scale insects and purple mite at this time of the year is not advisable because oil reduces the soluble solids content of fruit as well as retards degreening. Parathion is the most satisfactory scalicide for use at this time of the year because it does not give these adverse effects on fruit. However,

SCALE AND MITE ACTIVITY BY DISTRICTS*

District	Purple Scale	Red Scale	Purple Mite	Rust Mite on leaves	Rust Mite on fruit
West Coast	3.25	2.67	1.50	2.75	2.75
Indian River	3.02	2.32	1.09	2.70	2.88
Upper East Coast	4.00	3.17	.50	1.75	2.25
Gainesville	4.00	.00	1.00		
Orlando	4.57	4.43	1.43	1.75	2.25
Brooksville	3.60	2.82	1.15	1.00	1.00
Ridge	3.93	3.85	.93	2.84	3.50
Bartow	4.60	4.25	.88	2.63	2.50
State Average	3.89	3.41	1.05	2.21	2.64
Last Year	3.77	3.52	.95	1.76	2.33

* Third week in August. Activity is computed from populations, amount of hatching of scales, and number of groves with increasing or decreasing infestations. Activity is considered high if above 4.0 for purple mites, 3.0 for red scale, and 1.5 for mites.

of groves and even on parts of trees. For this reason, it is necessary to check more trees more thoroughly to properly determine the extent of red scale infestations than with any other pest.

Although purple and chaff scales won't be general problems this fall, there will be too many of these scales on fruit and green twigs in some groves. Since both of these scales cause green spots that cannot be removed from fruit in the coloring room, their presence on fruit can be a definite grade lowering factor. Also purple scale at the stem-end of fruit can cause a severe fruit drop later. Therefore, growers should check fruit for these scales particularly in groves not sprayed since the post-bloom period.

Groves should also be checked for rust mite and purple mite to get an idea of where the fall miticides will be needed first. Rust mite as well as purple mite are often numerous in tree tops when they are hard to find on lower foliage. It usually pays to climb a few trees.

many growers are reluctant to use it because it does little to help the purple mite problem. On the other hand, oil emulsion does little to help with the rust mite problem. Although, a miticide for purple mite can be included in parathion sprays, oil emulsion must be followed with an application of sulfur for rust mite.

Parathion can be expected to give control of purple mite for four to eight weeks where mite eggs are very scarce. Where mite eggs are numerous, however, parathion will not control purple mite and should either be supplemented with ovotran or followed by an application of some other miticide. Parathion should be used at the rate of 1.0 to 1.7 pounds of 15% material, or its equivalent in other forms, per 100 gallons of spray. Use the lower amount only in groves where scalicide sprays were used during the post-bloom period or where scale is at a low level for some other reason.

Next to parathion, the best scalicide for Fall use is the combination of 1 pound of 15% parathion plus 0.7% oil

* Written August 24, 1956. Reports of surveys by Harold Holtsberg, Cocoa; J. W. Davis, Tavares; K. G. Townsend, Tampa; T. B. Hallam, Avon Park; and L. M. Sutton, Lake Alfred.

emulsion. This mixture is an excellent scalicide and will give good control of purple mite. However, although its effect is not so great as a full strength oil, it will still reduce soluble solids, affect degreening and produce a leaf drop under adverse conditions.

Malathion is a good substitute for parathion at 3 to 5 pounds of 25% wettable powder per 100 gallons. This, of course, should be combined with wettable sulfur for rust mite control.

If, in spite of its drawbacks, full strength oil emulsion is preferred, use 1.7% actual oil on oranges and grapefruit, but no more than 1% on Temptles and tangerines.

Purple Mite Control: Although purple mite is not expected to be a general problem during September, some groves will undoubtedly be heavily infested while many more will have light infestations. Where there are only light infestations (anything less than 10% of the leaves infested with either mites or eggs), frequent checks are necessary so control measures can be applied before more than 20% of the leaves become infested. This course of action is recommended because good control is difficult to obtain after mite populations reach high levels.

There is also another good reason for spraying before high populations develop. By the time mites reach high levels, damage to foliage is already excessive. This means that foliage is already susceptible to the firing that can develop anytime during the fall and winter. Growers would be wise to remember the firing we had last winter. If we wish to prevent more damage like that, we must control the mites early.

There are several miticides available that are satisfactory for September use. The most effective of these is oil emulsion at the rate of 0.7% actual oil. As pointed out under scale control, however, oil should not be used where high solids and good degreening are necessary. Also, oil is not desirable where rust mite is also a problem since oil will not control rust mite. Three other good miticides, Systox, aramite and EPN-300 are also available and can be used with wettable sulfur. Systox should be used at not less than $\frac{1}{4}$ pint per 100 gallons while aramite is recommended at 2 pounds of 15% wettable powder and EPN-300 at 1 pound. Systox is perhaps the most effective of these three where mite populations have already reached high levels.

Another good miticide is ovotran. This material, however, is recom-

mended for use later in the season. Since mites become resistant where ovotran is used more than once a year and because it is effective only against the younger stages and hatching eggs, it is probably best to use this material during the winter when mite eggs are more numerous. However, if it is preferred to use ovotran in September or October, either $\frac{1}{2}$ pound of 15% parathion per 100 gallons or $\frac{1}{4}$ pint of 20% TEPP should be used with the ovotran to give a faster kill, especially if mites are at high levels.

Rust Mite Control: The most effective spray for control of rust mite is $\frac{1}{4}$ to 1 gallon of lime-sulfur per 100 gallons plus 5 pounds of wettable sulfur. This mixture, however, is more likely to burn fruit than wettable sulfur alone. For this reason, 10 pounds of wettable sulfur per 100 gallons is preferred on early season oranges, pink and red grapefruit, tangerines and Temple oranges.

These dosages are recommended where only rust mite control is needed. Where parathion or malathion is to be used for scale control, the amount of sulfur can be reduced to 5 pounds. Where a miticide is to be employed, the sulfur may be reduced to 8 pounds. Lime-sulfur, up

to 1 gallon per 100 gallons, can be used with parathion or ovotran, but should not be combined with aramite, EPN-300 or Systox.

For more detailed information refer to the 1956 "Better Fruit Program" or consult the Citrus Experiment Station at Lake Alfred or Fort Pierce.

Fruit Fly Spraying Continues

The work of spraying for eradication of the fruit fly continues. In some areas the spraying by airplane has been discontinued and ground spraying has taken its place. These are the areas where early spraying has apparently gotten the fly under control and where no new infestations have been discovered. The operators working under the supervision of the State Plant Board are receiving better cooperation of growers than was manifest at the outset and are proceeding with the work of extermination with vigor and determination. While the battle has not been won, it is continuing with confidence that it will end in victory.

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The recommendations of the Florida Citrus Experiment Station at Lake Alfred, published in January 1954, stress the need for large application of magnesium for Citrus in soluble form and state that it is usually applied as a Sulphate.

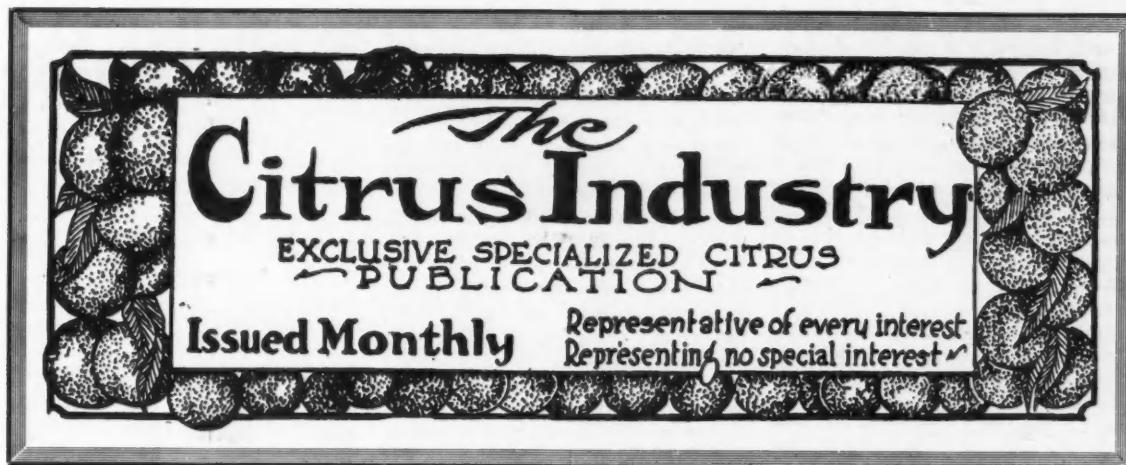
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Publication office at Bartow, Florida. Entered as second class matter February 16, 1920, at the post office at Tampa, Florida, under act of March 3, 1879. Entered as second class matter June 19, 1933, at the post office at Bartow, Florida, under act of March 3, 1879.

Present Status Of The Push And Treat Program For Controlling Spreading Decline

On July 27, 1956 the total citrus and avocado groves which have been found to be infested with the burrowing nematode, *Radopholus similis* (Cobb) Thorne numbered 995. Polk County with 598 infested groves accounts for more than half of the total. Highlands county is second high with 141 infested groves while Orange county is a close third with 121. Lake county is in fourth place with 82 and then there is a considerable drop to fifth place Pinellas with 12 known infested groves. There is a total of 17 counties having one or more groves infested with burrowing nematode, totaling between 7000 and 8000 acres.

The State Plant Board and the Plant Pest Control Branch of the USDA have inspected a total of 4667 different groves, 2353 nurseries and 594 dooryards and miscellaneous properties. Three hundred and ten nurseries and 115 dooryards and miscellaneous properties have been found to be infested with the burrowing nematode. Of the 7614 total properties examined, 1425 were found infested.

When a grove or other property looks suspicious of having spreading decline but the root samples taken do not yield burrowing nematode, another inspection is made. When a known infested grove is being prepared for pushing and treating a de-

— By —

H. L. JONES

ASSISTANT TO PLANT COMMISSIONER

(Paper Delivered at 23rd Annual Growers Institute, Camp McQuarrie August 14, 1956)

limiting inspection is made to ascertain, as near as possible, the extent of infestation in the grove. Nurseries shipping to California, Texas and Arizona must be inspected for burrowing nematodes once a year. Once a property is inspected, all additional inspections are counted as reinspections and the Plant Board and the USDA have made 2691 such inspections.

The State Plant Board set up its office for spreading decline at Lake Alfred in December, 1953. This office was established to make surveys to determine the status of spreading decline in the citrus producing areas of Florida, thus alleviating the Citrus Experiment Station personnel of an extensive phase of work to permit them to focus their attention on research.

The Plant Pest Control Branch of the USDA came into the picture on

January 24, 1955, to aid the Plant Board in making surveys to determine the extent of spread of the burrowing nematode throughout peninsular Florida.

During the latter part of June, 1955, the Governor of Florida signed an appropriation bill of \$1,756,300 for the express purpose of controlling or containing burrowing nematodes, cause of spreading decline of citrus and avocados. This bill had unanimously passed both houses of the Legislature.

As soon as this money became available, the Plant Board began putting its control program into effect. A special training machine constructed on a D-4 Caterpillar was purchased along with Jeeps, shovels, portable ice chests, microscopes and the many other items necessary to carry out the program.

By the last of September, 1955, the spreading decline program had taken shape. The Plant Pest Control Branch of the USDA assumed the responsibility of all identification work at the expense of curtailing its survey work.

As of August 9, 1956, there have been 1876.17 acres of citrus groves fumigated with DD (dichloropropene-dichloropropane). An additional 969.83 acres now being prepared for treatment, which makes a total of 2,846 acres of citrus groves pushed,

burned and treated or in the process. The number of properties treated thus far breaks down by counties as follows:

Counties	Properties	Acres
Highlands	38	309.25
Hillsborough	4	115.50
Lake	14	61.00
Orange	5	49.50
Pasco	1	12.00
Pinellas	1	5.00
Polk	169	1323.92
Total	232	1876.17

We have been running behind schedule in fumigating due to the lack of equipment, but now we have our second fumigation machine in the field and we should catch up to the pushing and burning operation within 3 or 4 weeks.

On July 16, 17, 18, and 19, 1956, in the circuit court at Bartow, Florida, Circuit Judge Don Register heard arguments concerning a request for a temporary and permanent injunction to prohibit the Plant Board from pushing out grove trees without the owner's consent. This hearing actually began on June 6 when an agreement was made between the plaintiff and the defendants to not destroy the plaintiff's grove until after the hearing and a ruling by Judge Register was received. This action eliminated the need of issuing a temporary injunction.

The following week Judge Register announced his decision on the case which was a refusal to issue an injunction against the State's pull and treat program.

The main issue which the plaintiffs, Mr. and Mrs. Harry Corneal, presented was whether the State had authority to destroy property under this particular situation without due compensation. It was pointed out by the State that California has been upheld by the courts, but actually charged the cost of the operation to the property owner and, if he refused to pay, took a lien on his property.

An intervenor in the case on the side of the plaintiff was Mr. E. A. Roop of Davenport who had used M-16, an organic fertilizer, which he claimed was improving the decline condition in his grove. However, the court felt that the evidence did not substantiate that claim.

The attorneys for the plaintiffs have given notice that an appeal will be made to the State Supreme Court relative to the compensation issue. As far as we know the M-16 advocates have not given any definite indication they will appeal.

The State Supreme Court has adjourned for vacations during the

month of August so it probably will be early in September before they rule on any appeals made.

During the court proceedings and before and after, we have been questioned at length as to the procedure the Plant Board has adopted relative to cover crops growing on treated soil, and handling infested dooryards. We have examined the host cover crops on a number of treated areas and have never found burrowing nematodes in the samples. However, the cover crops will be kept down when it appears necessary to do so.

Our plan to handle infested dooryards is to pull and treat whenever it appears that such a dooryard is endangering or might endanger a commercial grove. We cannot spell out that regulation in detail due to the many situations involved which will have to be worked out as the need arises.

Another question we hear often is, "Where are you going to begin the involuntary phase of the push and treat program?" or "Whose grove are you going to push first without the owner's consent?" We have already pushed a few groves without the owner's consent and many more are being offered by bids to bulldozing contractors. These and the ones to be pushed and treated in the near future will be those in sections where, adjacent to them the owners have already voluntarily had the Plant Board to push and treat. We feel these voluntary cases warrant protection as soon as possible to prevent a reinfestation.

The push and treat program is about one-third completed at the end of one year's operation. The USDA has increased its laboratory facilities and the Plant Board has stepped up its treating methods. It is now our aim to complete the remaining two-thirds of the program during the current fiscal year; that is, to treat all known spreading decline infestations in the commercial citrus producing areas.

FFVA Convention Plans Announced

Innovations in programming and nationally prominent speakers will highlight the 13th Annual Convention of the Florida Fruit & Vegetable Association at Hotel Fontainebleau, Miami Beach, on September 27, 28 and 29, according to Rudolph Mattson, president of the organization.

"The theme of our coming convention is Watch Your P's and Q's —

New Sales Manager For Dolomite Products

George E. Wetmore, Jr., Lake Wales, has been appointed sales manager for Dolomite Products, Inc., Ocala, effective August 1, 1956. W. M. Palmer, Sr., Dolomite Products president has announced.

Mr. Wetmore, a life-long resident of Lake Wales, has been sales man-



Wetmore



Palmer

ager of frozen products for the Florida Citrus Canners Cooperative, Lake Wales, for the last four years. He had previously held other positions with the cannery for a period of 21 years of continuous service.

He is 41 years old and married to the former Mary Agnes Bennett, Babson Park. They have three children. The Wetmores are members of the Episcopal church. Mr. Wetmore attended the University of Florida and is a member of Sigma Nu Fraternity.

He will replace as sales manager W. M. Palmer, Jr., who is assuming an administrative assistant to his father, president of the company.

a reminder on Production and Quality.

"The program will be developed along the lines of this theme with some of the nation's most outstanding authorities as speakers on the various phases of this general subject," Mattson said.

"FFVA Convention entertainment has always been outstanding, and this year our guests will enjoy the finest and most elaborate program our committee can produce.

"Invitations will be mailed within the next few days to growers, shippers and suppliers throughout Florida and in all the principal markets.

"Last year's attendance was a record breaker with nearly 1200 attending and from inquiries it is likely that this year's attendance will better that figure," Mattson added.

A Pathologist Visits Valencia

On January 30, 1955, the author left New York International Airport for an assignment of six months in Egypt. Traveling to Egypt by way of Spain, Morocco and Italy presented an opportunity to visit certain other citrus producing areas enroute, and arrangements were made to spend a week visiting the sweet orange and mandarin orchards in the vicinity of Valencia, Spain.

During their occupation of Spain, which ended in 1492, the Arabs introduced the culture of limes, citrons and sour oranges. However, the Spanish citrus industry is considered to date from 1871 when the first sweet orange tree was planted at the small town of Alcira, a few miles south of Valencia. Castellon, 50 miles to the north of Valencia, has become a center of tangerine production, and Seville to the south has become famous for lemons and sour oranges, but it was possible to visit only the Valencia area in the time available.

The province of Valencia is situated on the east coast of Spain, roughly midway between the Pyrenees mountains on the north and the Straits of Gibraltar to the south. At that point there is a narrow coastal plain bounded on the east by the Mediterranean Sea and on the west by mountains, which shelter the area from cold northwest winds. Temperatures rarely fall low enough to damage citrus in the Valencia area, but there is sufficient cool weather to color fruit beautifully. When the citrus at Castellon was severely damaged by cold in 1953, the damage at Valencia was only moderate.

The soils of the Valencia coastal area range from moderately deep sandy loams to shallow clay loams that often are rocky and underlain with bedded limestone. Much of the land is rolling and unsuited to irrigation. For many years such land has been planted to olive and carob. (The seed pods of carob trees are used to feed the horses and donkeys that are so important to agriculture in Spain). At one of the locations we visited near Valencia, workmen were



J. F. L. CHILDS(1)

stripping off the shallow soil and breaking up the limerock layer by hand. The broken rock was being carried away in wagons and the soil replaced and leveled for agricultural use. In the Valencia area good land is expensive and seldom offered for sale. Bare land suitable for citrus is valued at \$3,000 to \$6,000 per acre, and good land with bearing citrus

orange are recognized depending largely on the smoothness of the rind. Doble-fina is smoothest, Entre-fina intermediate, and Murtera the most coarse. The fruits of this variety are slightly elongate, and the flesh is only moderately red. Sanguinella (Fig. 1.) a blood orange originally from Italy, is grown to some extent. It is characterized by a strong red blush of the rind, deeply colored flesh and red juice. Other popular sweet orange varieties are Washington Navel, Cadenera, Berna, Valencia, and Valencia Tarde (late). Cadenera and Berna are both of excellent quality. Salustiana (Fig. 2.), a selection from Cadenera, produces especially fine fruit with a flavor very like that of Washington Navel. The Valencia late (tarde) is said to be a comparatively recent importation from the United States. It is 4 to 6 weeks later than the common Valencia.

Two varieties of mandarin are commercially important in Valencia province, the Spanish and the Clementine. Of the two, the Spanish is the more popular and widely grown. The fruits average somewhat larger than Dancy tangerines as grown in Florida, and the rind color is rich orange-yellow but without any red color. Fruits tasted in the Sagunto area were of fine quality. In early February, at the time of my visit, fruits of this variety were being picked and

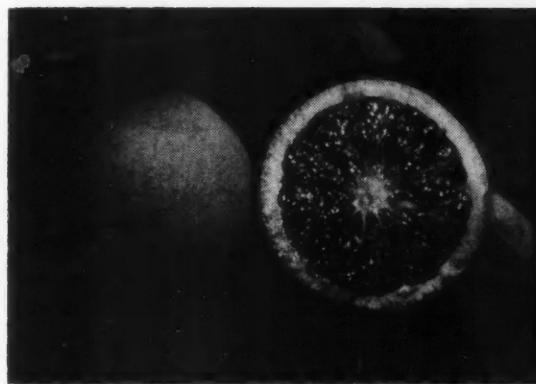


Fig. 1. Sanguinella, a blood orange with red juice.

trees is valued at \$10,000 per acre. Some of the best citrus is grown on hillsides where the soil has been terraced with retaining walls of stone or concrete.

Varieties of Citrus

Many varieties of sweet orange are grown in the Valencia district, but blood oranges appeared to predominate. Three grades or types of blood

shipped to market in northern Europe. The Clementine fruits had been picked earlier and were not available for comparison.

Several small plantings of lemons of the Berna variety were seen in the area south of Valencia. Because of the fences we were unable to examine the trees closely, but they appeared to be in good health and with no

(1) Senior Pathologist, Horticultural Crops Research Branch, Agricultural Research Service, U. S. Department of Agriculture, Orlando, Florida. Visit to Valencia under auspices of I. C. A. (formerly Foreign Operation Administration) Jan. 31 - Feb. 7, 1955. The author is indebted to Sr. Dr. J. M. del Rivero, pathologist of the Burjasot Experiment Station, Valencia, and to Sr. Carlos Escrivá of American Cyanamid Co., Valencia, for their kind assistance and to Mr. Burl Stugard, then agricultural attaché in the American Embassy, Madrid, for making necessary contacts and travel arrangements.

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evidence of shell bark or gummosis. On the experiment station grounds at Burjasot, which is on the outskirts of Valencia, some grapefruit trees were seen but no commercial plantings were encountered. Sour orange is the principal rootstock in the Valencia area for all varieties of citrus, and no other was seen in common use. Trees on their own roots were occasionally met with.

Methods of Culture

In the Valencia area citrus plantings are small, usually less than 30 acres, and the trees are commonly planted at the rate of 150 per acre, roughly twice as many as in Florida. Such close planting is possible because the cultural operations are all done by hand. In spraying (mainly for insect control) the spray machine is left in the roadways outside the orchard and spray hoses are dragged from tree to tree. Much of the fruit is sorted and packed in the field, but for export it is usually repacked at one of the more modern packing houses.

By Florida standards citrus trees in Valencia are small for their age. This condition is partly the result of crowding and partly the consequence of excessive pruning. A crew of men seemed always to be at work among the trees pruning or doing some other cultural operation. Digging away soil from around the root crown (Fig. 3), a control measure against infection with the foot rot fungus (*Phytophthora* sp) was a common practice. Removing the larger rocks from the soil was another. Some of the operations possibly were scheduled to keep the labor force together during slack periods rather than because the work was essential.

Spanish citrus growers occasionally topwork their trees (Fig. 4), to other varieties by means of a method seldom seen here in Florida. Patch buds 1 inch by 1½ inches square are applied to limbs approximately 1½ inches to 2 inches diameter. Later the branch is ringed above the bud and then cut off at that point. This method was giving excellent results and perhaps should be tried in a limited way for topworking old trees in Florida.

Diseases

Citrus foliage was generally healthy in appearance and quite abundant in the Valencia area, although a dry wind some 10 days prior to my visit had burned some of the leaves on trees in exposed locations. Symptoms of mineral deficiencies were seen in a few locations. Of these, zinc deficiency was seen most frequently, but symptoms were usually confined to a few leaves on an occas-

ional tree. At the experiment station at Burjasot and also at Alcira rather striking symptoms of boron deficiency were seen on grapefruit and several of the sweet orange trees at the Burjasot station exhibited symptoms of iron chlorosis. At no place were deficiency symptoms serious or even commercially important.

It was impossible to assess with accuracy the distribution and import-

cucumber mosaic virus on tomato plants. The majority of leaves on the trees were normal in size and shape, and there was no evidence that trees bearing "shoestring" leaves were less productive than normal trees.

Greasy spot symptoms were seen on Berna orange at several locations and were especially prevalent on the foliage of Spanish mandarin trees

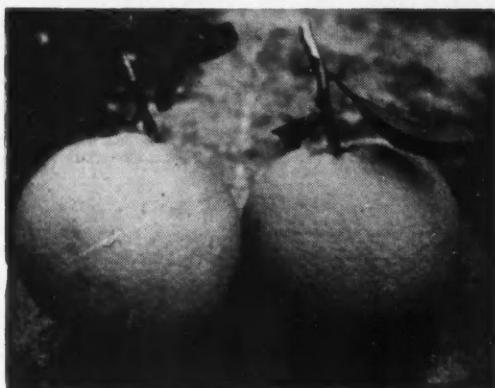


Fig. 2. Salustiana, a selection from Cadenera sweet orange with excellent appearance and quality

ance of infectious diseases in one week, but certain troubles were observed frequently enough to warrant mention. There were no immature leaves on the citrus trees, and consequently leaf symptoms of psoriasis were not visible; but there is little question but that psoriasis ranks first among the important diseases in this area. The Washington Navel trees appeared to be generally infected with the type-A bark scaling form of psoriasis, which was obviously shortening the productive life of the affected trees and reducing fruit production. At several locations psoriasis infected Navel orange trees were being removed and replaced. It was generally believed that the psoriasis virus came from Navel orange budwood imported from California. However, infection could have come from many sources since most strains of Navel orange are infected with psoriasis. At one location Spanish mandarin trees affected with the blind pocket form of psoriasis were being topworked with Washington Navel and a number of old trees of the Cadenera variety also were seen to be affected with blind pocket.

A peculiar "shoestring" form of leaf distortion (Fig. 5), was seen on Berna orange trees at several locations in the Alcira district and elsewhere. The distorted leaves were abnormally narrowed and elongated, giving them a strap-like appearance. This symptom reminded one of the "shoestring" type of leaf distortion caused by

near Sagunto. Greasy spot is caused by a fungus, *Mycosphaerella hordei* (K. Hara), and under Florida conditions can be controlled with copper sprays. On Spanish mandarin leaves the spots were concentrated on the underneath side of the leaf near to the midrib in much the same position as the leaf markings caused by six-spotted mites (*Eotetranychus sexmaculatus* (Riley)) on citrus foliage in Florida. Since rust mite (*Phyllocoptes oleivora* (Ashm.)) is not known (or not reported) in Valencia, one of the red spiders may have been the "accessory before the fact," and this may also be the case in Florida. If that is true it would explain why fairly good control of greasy spot may be obtained in Florida with oil sprays but not with sulphur.

Without question the most damaging and pernicious disease agent in the orchards of Valencia province is the pruning hatchet in the hands of orchard workers. They seem to exercise very little restraint in their pruning operations, and often injure trees severely. One grower had his trees damaged so severely in a single pruning operation that he sold the orchard rather than attempt to rebuild it. Occasionally pruning wounds are given disinfectant or moisture-resistant dressings to prevent wood decay, but more often they are not. Neglect of pruning wounds is naturally followed by wood decay, and Spanish orchadists believe that fruit on a tree with wood decay will not be-

come sweet unless the decayed wood is removed. If no wound dressing is applied, excavation of decayed wood is followed by further decay. Thus alternate decay and excavation may be repeated until tree trunks become literally riddled with holes and excavations (Fig. 3). (I was unable to learn the names of the wood decay organisms or whether they are the same as those found on citrus trees in Florida).

Insect Pests

Spanish citrus is sprayed mostly for the purpose of insect control. In the past fumigation with cyanide gas has been an important part of the control program, but of recent years the emphasis has shifted to the use of oil sprays. This change seems to have come about partly because good insect control resulted from the use of oil sprays with less danger to operators and partly from a desire to keep abreast of current control practices in other areas, especially California, where fumigation is going out of favor. The Spanish authorities consider parathion too dangerous under their hand labor conditions.

Mediterranean fruit fly (*Ceratitis capitata* (Wied.)), a very important insect pest in the Valencia area, causes the loss of much citrus fruit during the warmer months. Bottle traps of standard design baited with a 4 per cent solution of ammonium phosphate are hung on the citrus trees. Whether these traps provide more than a token control was difficult to determine. Fly-infested fruits were seen on the trees from time to time, and at one location recently



Fig. 3. Method of tree surgery used to treat heart-rot. Soil is excavated around root crown for foot rot control.

fallen fly-damaged fruit amounted to about half a bushel per tree.

Near Sagunto a rind blemish called rosetta was observed on Spanish mandarin fruits. This blemish is caused by the feeding of a leaf hopper (*Empoasca decipiens* (Paoli)), according to Sr. Rivero, pathologist at the Burjasot Station. The blemishes are roughly circular areas, $1/8$ to $1/4$ inch in diameter, where the epidermal cells have collapsed and turned white as a result of insect feeding, leaving the oil vessels conspicuously prominent.

port of rust mite in this area.

Mealy bugs were seen only occasionally, probably because of the very effective control obtained with *Cryptolaemus* lady beetles. The beetles are reared on potato sprouts by the entomology section of the Burjasot Station and distributed each year to citrus growers in small packages. The growers are instructed to place five beetles in each tree, as that number has been found to give excellent control of the mealy bugs.



Fig. 4. Mandarin orange tree topworked with Washington Navel scions

ment and yellow. *Empoasca decipiens* is customarily controlled with DDT, according to Sr. Rivero.

Damage to citrus leaves from red mites was rather common in the Valencia area, but no evidence of citrus rust mite (*Phyllocoptes oleivora* (Ashm.)) was observed. In the literature there seems to be no re-

Concluding Remarks

By Florida or California standards the citrus industry in Valencia is a small scale operation with many seemingly old fashioned methods still in use. However, it must be remembered that in this area hand labor is readily available and cheap. Also most citrus plantings are small — less than 50 acres — with the average probably about 10 acres. Under such conditions hand labor often has important advantages over machine operations and consequently, operations are geared to hand labor methods. While certain changes in method are obviously indicated, as for example in the pruning practices current in the Valencia area, it does not follow that all hand labor operations are necessarily inefficient and expensive.

In spite of its small-scale nature, the Valencia industry is a very intensive type of enterprise. The high quality fruit finds a ready market in English and continental markets and gives the producer a very satisfactory return on an investment which is high even by California standards. With the exception of psoriasis, the incidence of disease is low, and with the exception of the Mediterranean fruit fly, the insect problems are few.

It is difficult to determine whether the favorable state of affairs as re-



Fig. 5. Shoestring type leaves on a Berna orange tree in the Alcira district

gards disease is the result of isolation or the long continued use of Spanish varieties plus a conservative attitude towards the introduction of foreign varieties, or a combination of these factors. The fact that Spanish citrus trees are generally in good health except for the Washington Navel (a comparatively recent introduction), plus the fact that most of the commonly grown varieties appear to have arisen in Spain possibly from seedlings, lends some to support this idea. At present, however, psoriasis-A has been spread throughout the Valencia area and is causing appreciable losses. A program to clean up psoriasis would be of great value especially for growers of Navel oranges.

USDA Proposes Amendment To Grade Standards For Limeade Concentrate

The U. S. Department of Agriculture recently announced a proposed amendment to the United States grade standards for frozen concentrate for limeade.

The proposed amendment would permit the addition of a suitable green food coloring material to standardize the color of the product. The proposal was made at the request of leading producers.

Interested persons have until September 17 to submit views or comments on the proposed amendment to the Fruit and Vegetable Division, Agricultural Marketing Service, U. S. Department of Agriculture, Washington 25, D. C.

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Preventing Planting Losses In Citrus Trees

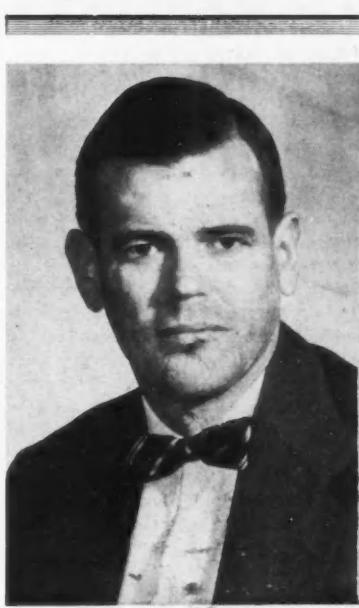
Most of you have met at one time or another the very proud fellow who informs you that he planted a twenty three past Spring and did not lose a tree. Unfortunately for the nurserymen, there aren't enough of these fellows around. Too often the opposite is the case — the long distance wires sizzle and the operator holds her ears while an irate grower complains to the nurseryman that his trees just up and died in spite of frequent waterings and motherly care.

You may think this is exaggerated but just ask any nurseryman. Most times the grower doesn't take time to explain why he thinks the nurseryman is at fault, but that the fault lies at the nurseryman's door there is no doubt. Similarly, I am sure that most nurserymen feel just as strongly that the reason for tree losses lies with the grower. That if the grower had planted carefully and watered frequently, there would have been no loss.

Somewhere in between, and possibly for certain physiological reasons we as yet know little about, lie the real reasons for losses. However, there are several precautions that we as nurserymen and growers can observe to lessen planting losses. For clarity's sake, let us divide them into 3 categories: (1) precautions to be taken at the nursery; (2) precautions in transit; and (3) precautions to be observed by the grower in planting and subsequent care.

The diligent nurseryman will follow a moderate path of fertilization, providing sufficient plant food to promote healthy growth, but not too much or too strong a mixture to force the trees too rapidly. If he knows when the trees are to be dug, he will leave off fertilization in time for the trees to harden or go dormant, if this is possible. He will keep a constant watch for insects and spray when necessary, and will cultivate often. Also he will sprout and tie continuously from the time the bud first comes out in order to grow a straight clean tree.

At the time the nurseryman receives the order to dig the trees, he will plan his work so the time between digging and delivery will be held to the minimum. Very rarely does this time exceed 24 hours and most times it is more likely about 15. Where possible, most nurserymen prefer to dig in the afternoon for the next



G. F. WARD
AT CITRUS INSTITUTE,
CAMP McQUARRIE

morning's deliveries. Where the customer calls for the trees, he tries to plan to dig the trees the same day, and, if possible, within a few minutes of the time the grower arrives.

The nurseryman should select carefully the blocks for digging in order to avoid digging trees that are in a new flush of growth. He will take care to paint his topping cuts with an antiseptic paint that will minimize infection. Here we might mention that there is a diversity of opinion regarding the proper topping of trees for planting. Some growers prefer a single stalk, some a four to 6 inch buckhorn, and some even have the tops left on. Some growers defoliate the trees and some leave the leaves on. I believe Dr. Grimm has some interesting studies on this and I will only say that we recommend a buckhorn with leaves on.

The nurseryman is just as interested in digging trees with long roots as the grower, but anyone who works labor these days knows that toward the end of a long day, the men are prone to dig closer to the trees and a little less deep. But this is the nurseryman's problem and he should

guard against it. Immediately following digging, the trees should be taken up at once to a shed or shady space, where the roots should be wet thoroughly and protected against drying out by covering with moss, excelsior or tarpaulin. Exposure to the air should be held to the minimum.

That brings us to the second category of precautions. If the nursery is to deliver the trees, they should be packed tightly on a truck with an air-tight body. Excelsior or moss should be spread over the trees after they have been thoroughly wet down and then more water applied. A weatherproof covering should then cover the load completely and be tied down securely. If the truck is not to depart immediately, it should be parked under a shed or in the shade. The driver may again wet down the load before departure. Usually delivery is made in the early morning hours before the sun is up; however, if delivery is made during the day, care should be taken to check the trees often and wet when necessary.

If the grower is to call for the trees, he should have a check-list including tarpaulin, moss or excelsior, and rope. Needless to say, he should provide an adequate conveyance. Nothing is more frustrating than to try to cram a pick-up load of trees into an automobile trunk. Off hand I would limit auto trunks to 35 5/8 inch trees. Station wagons can haul 250, 5/8, but the packing of the last 100 gets to be a chore. A truck is much preferred and is necessary for orders of 300 and more. The same precautions in packing should be observed as before. Since the grower usually calls during the day, he should be careful not to stop for long intervals en route back as the trees might become too warm or dry out.

As the trees reach their destination, the final category of precautions should be observed. The byword is "Be Ready." By this, I do not mean that the holes should be dug — in fact, I would recommend against digging the holes ahead of time since this allows the soil to dry out and grow hot. I do mean that the land should be prepared and staked; that the necessary equipment be gathered and in working order; and the labor force on hand, knowing what their jobs are to be. Also some provision should be made for the load of trees.

The best procedure is to heel in the trees that cannot be planted in the first 3 or 4 hours. This should be in a cool, shady place and plenty of water should be used during the process. The next best procedure is to pack the trees in a tight pile in the shade and cover with wet excision or moss and then with a tarpaulin. Care should be taken to wet the trees frequently during the day. The worst thing that can be done is to leave the trees exposed to the sun and air, and just about as bad is piling them in the sun and covering with a tarpaulin only. The trees to be planted immediately can be carried in water barrels or under wet excision or moss on a truck. The most important thing to remember is to keep the trees moist and cool until planted.

Nearly every grower has his own pet way of planting. I know of one newcomer to the business who tried to plant by kicking dry, hot sand onto the roots and watering some 6 or 8 hours later. Is it any wonder he lost 350 of his 400 trees? I'm surprised the 50 lived. Some growers believe in planting "dry"; that is, to plant the trees without water by using the dry soil from the hole packed around the roots and then watering in within a few minutes or perhaps hours. They claim greater speed for this method. I find two definite disadvantages to this method: first, if the soil is dry and hot, it will tend to dry out and perhaps injure the feeder roots prior to the time the tree is watered; and second, in the heavier types of soil there is more of a tendency to produce air pockets around the tap roots. A very striking example of this difficulty was found in a 10-acre planting near Ft. Green in Hardee County last year. About 75 percent of the trees planted were found to have air pockets varying in size from a golf ball to a pocket large enough for both fists to fit in. Planting loss here ran about 50 percent.

We recommend the practice of planting "wet" or what is sometimes called "puddling in." The size of the planting crew is governed by the acreage to be planted. A crew of 4 men and a foreman can easily handle 10 to 15 acres a day. Minimum equipment would include a water-rig, either truck or tractor-drawn, and some conveyance for transporting the unplanted trees. The crew consists of the hoe-man, the planter, the copper and the driver. Let me describe the procedure using this small crew. Out front the hoe-man opens the holes around the stakes. The planter follows him. As the planter kneels beside the hole, the foreman hands him

the tree to be planted. The planter places the tree at its proper depth (no deeper than the tree was growing in the nursery) and spreads the roots in their natural pattern. As he begins to work in the soil around the tap root and the lower roots, the water-rig driver lets in about 10 or 12 gallons of water. The planter continues to bring soil into the hole, packing it firmly round the roots until the tree is completely planted. As he moves on, the copper builds a cup around the tree sufficiently large to hold 10 to 12 gallons of water. The cup ring is made from soil drawn from outside the cup, not inside. He then tramps around the tree to pack the soil and checks the tree for vertical alignment and makes any adjustments necessary. This procedure is so timed that each operation takes from 30 to 45 seconds so the planting progresses steadily. This procedure may be varied to suit the occasion. Two planters may be used on the one row, planting alternate trees. Or the crew may be doubled and two water-rigs utilized to plant 2 rows at a time. Labor-saving devices such as tractor-mounted earth augers can be used to replace the hoe-man.

It is advisable to double back with the water-rig at the end of the day, or not later than the following day, to give the trees a second watering. This helps settle the soil firmly around the roots. Another watering should follow within the next 4 or 5 days, and thereafter at intervals of 5 to 7 days until the trees are established. Care should be taken not to let the trees go into a wilt as damage to the trees may occur. Very often such damage is so severe that the tree never recovers.

Very often a grower asks what he should use in the hole in planting the tree. Our answer is "soil and water only." Actually some growers have found that about 2 pounds of steamed — not raw — bone meal is helpful. Also I know of one large corporation using vermiculite mixed with the soil. This helped to conserve moisture and resulted in a good "live," so I'm told. The main precaution here is not to use any fertilizer or organic material in the hole as these will burn the feeder roots.

In order to give the newly set trees an added push, some growers have added 1 pound of nitrate of soda to each 100 gallons of water on the second watering after planting. This amount cannot hurt the tree, but I would caution against using more. Perhaps similar use of liquid fertilizer could be made, but I pass this decision on to a fertilizer expert.

About 10 days to 2 weeks after planting, fertilize the trees lightly — about $\frac{1}{2}$ pound per tree, more or less, according to size — with a complete plant food such as 4-7-5 or 5-6-5 with secondaries of magnesium, copper, and manganese. Fertilize at intervals of 6 weeks thereafter during the Summer months, gradually increasing the amount to an ultimate of 1 pound per tree by Fall. Do not fertilize after October 15. Fertilizing may be resumed about March 15. Care should be taken to distribute the fertilizer evenly around the tree — not in gobs or up against the trunk.

During the early growth of the tree a careful watch should be maintained for die-back. Die-back is usually caused by lack of moisture and is held to a minimum by frequent and adequate waterings. Should this occur, water the tree immediately and often. Wait until the tree puts on a good growth and this growth hardens then prune out the dead wood and paint with an antiseptic pruning paint.

Another type of damage to look for is that of the grub or sawyer beetle. This beetle lays eggs in the dead wood at the pruning cut. The larvae on hatching feed on the dead wood but will continue boring into and feeding on green wood causing this to die. Should these sawyers be found while still in the dead wood, the best treatment is to insert a wire into the hole to kill the sawyer and then paint the cut with an antiseptic paint. If the borer has gone into the green wood, it will then be necessary to prune below the damaged area and paint as before.

Of course watch should be kept for the common citrus insects and scales, and spraying should be performed when necessary. Such spraying together with spraying for nutritional purposes is adequately described in publications by the Citrus Experiment Station and the U. S. D. A.

I have left to the last the controversial question of "When to plant?" We have observed plantings made in every month of the year. From our own experience we have found greater losses occurring during Summer plantings and therefore discourage this. The advocates of Summer planting use as their arguments the contention that Summer rains make possible the elimination of many waterings. Frankly, we haven't found anything consistent about the Summer rains of late. In fact as of this day there are some new plantings in our section wilting and dying for lack of rain. Also all too often the grower will depend upon a light shower or

(Continued on page 21)

Reaching New Horizons For Florida Citrus

Florida Citrus Mutual is deeply grateful of this opportunity to address so many friends in this widespread industry of ours at the 23rd Annual Citrus Growers Institute, which has become thru the years, the acknowledged forum for progressive ideas and latest development in grove practices.

One thing that impresses me most about the way the agricultural economy of our country operates is that wherever the prime producer — the grower — of a particular commodity is prosperous — and I mean prosperous on a sound, independent, financial basis devoid of Governmental handouts with its inevitable regimentation — then that entire industry usually is also prosperous. It is Mutual's basic fundamental policy to keep the Florida citrus grower — and the industry — on such a sound prosperous basis.

Of all fruits produced within the Continental United States, we have enjoy a unique and enviable position compared with many other tree crops. Under ideal conditions, citrus can only be grown commercially in just five states — California, Arizona, Texas, Louisiana and Florida. Compare this with the apple crop which is grown in 35 states! Or cherries in 12 states; grapes in 20; peaches in 37; pears in 30.

This geographical limitation is a distinct advantage because it enables the citrus industry to centralize its exchange of ideas far more rapidly and thereby facilitate marketing problems, than if it were widely scattered like so many fruits.

Nevertheless, all of us must realize and appreciate that every fruit grown is inter-competitive. Look at the grocery produce department displays — you will see oranges, pears, peaches, grapes, cherries, apricots and apples all jostling and clamoring for the Housewife's dollar. Take a look at the canned goods department likewise; tinned fruits of every description. The same goes for canned or frozen juices with their bewildering selection of varieties.

Another feature of tree fruits that makes them unique within the horticultural family is that it takes a number of years between the setting of a grove or orchard and any financial return to the grower on his



M. E. HEARN

EXPORT COORDINATOR FLORIDA
CITRUS MUTUAL

SPEECH AT CAMP MCQUARRIE
AUGUST 16, 1956

investment — frequently a period of seven years or more. And once trees reach full maturity, there is little that man can do, except in the matter of fertilization and pruning, that enables him to curtail production in the same way as can be practiced in annual crops like watermelons, strawberries or corn by acreage reduction.

This inability to control output in accordance with current domestic requirements makes it vital for tree fruits to find new outlets where, in years of heavy production, part of the crop can be profitably channeled to avoid disastrous price collapses. The New England apple growers found this maxim to be true even before this country became an independent nation; apples have been exported from the United States to Europe for nearly 300 years. Even in the years before World War II, certain varieties of citrus found in a ready market in Europe, and the United Kingdom alone absorbed up to 42%

of Florida's total canned grapefruit sections pack.

Another desirable feature of export is that, European consumers prefer the smaller varieties of fresh fruit usually discounted in our own domestic market. And all fruit trees produce a certain percentage of small sizes, in years of heavy or light production, and it is these types that invariably fetch a premium on the European market. The current season furnished proof of this situation — exporters paid as much as 50c a box above domestic prices for Florida 288's and 324's to export.

This export market has been one of the horizons that Florida Citrus Mutual anticipated several years back. Basically, it can be considered under the general heading of Research — research for new "plus" outlets, in a similar long-range fashion that research for new products and by-products of citrus is being conducted every day by State, Government and private agencies.

Mutual was the very first organization in this state to initiate, on an industry-wide basis, a program for developing overseas markets for the benefit of the grower, shipper and processor. Until 1953, no group had even considered spending the time, money or personnel to set up a full-scale project. What foreign business had been done was purely incidental or accidental — and scarcely considered a worthwhile part of the overall picture, consequently no long-range program was ever contemplated. Exports were a stepchild — with little or no encouragement — in fact, there was more downright pessimism — from most quarters as to the possible success of the project. And, consequently, there had been little if any sustained contacts undertaken with the Foreign Agricultural Service, Congress, and other fruit trade groups interested in foreign markets.

Preliminary work by our economist showed without contradiction that exports had a definite price impact on the value of the citrus crop far in excess of the actual volume moved. Every million boxes of Florida oranges shipped overseas either in fresh or processed form results in a valuation increase of 5c per box on the entire remaining production consumed domestically; on

grapefruit, when production is within tolerable limits, this figure is 13c per box. Put it another way, if 1% of our oranges by volume are exported, the additional dollar return to growers amounts to 3.09%; if 2% are exported, the extra grower return at on-tree level is 6.18%; if that figure reaches 4% volumewise, additional grower income from this diversion would total over 12% of the entire revenue. This clearly shows therefore that exports exert an effect not in direct, but in geometrical proportion on the whole price pattern.

The main thing too, to remember in this entire program, is that it does not matter one bit if it is your own fruit or your neighbors that is shipped to overseas markets; the mere fact that a certain percentage of the entire crop is being withdrawn either in fresh or processed form from domestic channels exerts a beneficial influence on the overall price picture. It is very much like having your cake and eating it too.

Furthermore—and of importance in the price pattern too—this "plus" foreign market helps both shipper and processor because they are placed in a better bargaining position with their domestic customers in the interplay of give and take as two customers are bidding for the product. An example of this occurred recently, when, through the efforts of Mutual and others, the British Government agreed to imports of \$1,000,000 worth of Florida grapefruit sections. This not only withdrew close to 15% of the entire canned sections inventory from domestic circulation, but improved prices over 10c per case which worked back to nearly 15c a box on-tree. Another illustration was early March of this year when demand for fresh Florida oranges picked up markedly as a result of the Spanish freeze. The export business suddenly surged ahead and during those months of March and April, 15% of all the fresh oranges packed in Florida went abroad. Today, you will hardly find a shipper that will not concede that our exports this year were a stabilizing influence during the middle of the season, just when prices could have sagged.

Based on this knowledge that exports help every segment of the industry, from the very outset we adopted a policy of strict impartiality as to what form or variety of fruit should be exported and merely concerned ourselves with stimulating the overall effort. A double assurance on this is furnished by our Export Committee, composed of shipper - processor representatives

drawn from the industry itself which submit suggestions, recommendations and plans of their particular wishes regarding export problems.

The basic problems that faced us when starting out on this foreign trade development program were (1) Loss of former pre-war markets due to financial and currency difficulties of buying countries. (2) Overcoming the protectionist attitude of many potential outlets anxious to safeguard their own domestic fruit industries (3) Educating foreign consumers to our fruit and fruit products and (4) Improving the out-turn of our fresh fruit, horticulturally more susceptible to decay than thicker-skinned Mediterranean or California fruit.

countries to acquire our products in their own money, with the foreign counterpart funds proceeds to be used by our Government in discharging its foreign obligations. From this proposal finally emerged the Mutual Security Acts of 1953 and 1954 and the Agricultural Trade Development Acts of 1954, which assisted the fruit industries of this country, including citrus in selling close to \$50,000,000 worth of fruit during the past three years. To further streamline this nationwide industry efforts and give it Congressional as well as national recognition, the major fruit groups, a year ago formed the United States National Fruit Export Council. Mutual was

Season	Exports—In Box Equivalents		Additional Income To Florida Growers Because of Export	FOB Value of All Exports to Shippers and Processors	% of Grower In- come from Orange Exports	Mutual's Export Budget
	Oranges	Grapefruit				
1951-52	405,412	315,754	\$ 1,529,605.—	\$ 2,660,801.—	2.67 %	*
1952-53	722,060	364,144	2,519,780.—	3,773,855.—	2.82 %	\$ 1,500.—
1953-54	1,774,441	907,619	7,787,860.—	9,983,644.—	7.33 %	12,379.95
1954-55	2,011,526	721,106	8,566,327.—	11,025,871.—	7.69 %	12,417.12
1955-56**	2,322,095	1,229,698	12,256,000.—	12,538,000.—	7.90 %	14,000.—

*—Mutual's Export Division not operative

**—Mutual's Export Division began July 15, 1953

**—1955-56 Season figures are still provisional, awaiting season on-tree average prices and final crop figures; also fresh and processed movement only covers period Oct. 1, 1955 to June 30, 1956.

Realizing that all our domestic fruits were intercompetitive, and yet that apples, pears, grapes from other states had a long traditional record of exports dating back before World War I, we immediately contacted other trade organizations throughout the country and instituted a clearing house of information, working closely on all matters, especially financial and legislative, that would facilitate reopening of these outlets. As result of this close friendly collaboration, the fruit industry of this country was the first group to propose to Congress a currency convertibility law which would enable dollar short

one of the prime movers in this project and is the only Florida representative that is a charter member and a Director of that Council. Directly or indirectly, this new organization represents over a quarter of a million fruit growers, over one thousand shipping and processing firms with a billion dollar investment in 41 states. Our own senior Senator, who has always been vitally interested in fruit exports, followed the formation and progress of this new body with a great sympathy and interest. And, today it is significant to note that the entire fruit export industry of this country when it



comes to legislative matters or obtaining administrative interpretations with Government departments, invariably turns first to Senator Holland, a ranking member of the Agricultural Committee recognized by all his other colleagues as the authority on fruit export problems. A tribute to his efficiency and untiring devotion was recently expressed by the Dried Fruit Association of California, who informed him that their industry regarded Senator Holland as the third, and possibly most important Senator from California.

Tariffs were another serious stumbling block in reopening new markets, and numerous domestic growers in those countries, who were enjoying a period of abnormally high prices because of deliberately restricted supplies from outside endeavored to encourage even more crippling restrictions. Working with the Administrative branches of Government, notably the foreign agricultural service of the USDA, State Department, the Tariff Commission and the Committee for Reciprocity Information, we have been successfull in securing numerous tariff concessions from major importing areas though the General Agreement on Tariffs and Trade meeting which takes place each year in Switzerland. The last round of discussions resulting in obtaining import duty cuts of 32 per cent on citrus juices in Germany, 25 per cent slash on frozen orange concentrate into Canada; a 16 per cent reduction on all juices in Belgium, Holland and Luxemburg, plus a number of other cuts from 5 other nations. This will certainly mean increased demand and consumption by foreign purchasers of our oranges and grapefruit.

The gradual resumption of movement overseas of our fruit, made it mandatory that consumer demand and shelf movement be stepped up if foreign importers were to continue being interested in handling the output of our groves and assure properly unanimous distribution. With the unanimous support of Mutual's Industry Shipper and Processor Committee, the setting up of a regular export advertising program was recommended to the Florida Citrus Commission; at the outset, the budget was small because some highly conservative circles still felt the outlay would not bring the desired returns in volume, and only \$10,000 for fresh oranges was appropriated during the 1953-54 season plus display kits and point-of-sale material; this sum was likewise repeated in 1954-55, but for the current season a full-dress program was passed with an appropriation of \$108,000. The results Mu-

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TENNESSEE BASIC SLAG • VIKING SHIP BRAND CALCIUM NITRATE

tual had repeatedly predicted already have been fulfilled — demand for Florida citrus in Germany alone has increased so spectacularly that jobbers and distributors are having a hard time meeting distributors' orders.

In 1953-54, export houses in New York and their representatives abroad were highly pessimistic over prospects of increasing Florida's sales of fresh citrus abroad — mainly because of the poor performance in previous years where some lots showed as much as 70 per cent decay at destination and auction houses in Antwerp and Rotterdam lost heavily. After a series of conferences with Lake Alfred Experiment Station as to the practical aspects of introducing suitable fungicides and tightening up on shipping regulations in USDA export programs, we recommended mandatory use of diphenyl and the introduction of the half-box pack for overseas business. The carton container people were first in licked the problems of getting a satisfactory box and the following season saw these diphenyl-treated cartons used on a large scale — over 1,200,000 units were shipped and the average decay incidence of Florida oranges dropped down to a commercially accepted level of less than 5 per cent; thanks to tests shipments carried out by the Department of Agriculture's representative, John Winston of their Research Station in Orlando and initiated by the Florida citrus growers organization, this decay incidence dropped even further this season, averaging slightly less than 3 per cent overall — an even better performance than California's.

Something significant happened during the 1955-56 season; there was a complete switch from half-box cartons to half Bruces by foreign buyers, because of the potentialities present in the end use of a wooden container. This feature is most important in setting up plans for export packs and one to which I shall revert a little later on.

What have been the results in this drive for export markets to date? The chart gives you a striking answer, and I shall comment on it briefly.

What are future prospects? Once the matter of new import regulations that might be imposed by foreign countries as the result of the Medfly infestation, and the current negotiations with the Food and Drug Administration on the use of fungicides are satisfactorily hurdled, we can certainly predict increased European demand for fresh citrus. Subject to these reservations, we fully expect orange (fresh and processed) exports

to increase during the 1956-57 season and total over 2½ million boxes; grapefruit, with promotion from the Commission will also show a jump, and we expect the total figure to hit the 1½ million box mark. For the 1957-58, these figures are fully expected to increase still further.

These are our objectives. To achieve them, we have set up the following — point program:

1. Greatly increased activity at Government and Congressional levels to obtain further worldwide relaxations for all Florida citrus products.

2. Stepped up program of exchange of information among the various industry groups and trade groups.

3. Inclusion of officers of the Florida Canners Association and the Florida Citrus Commission on our Export Committee.

4. Recommendation for increased expenditures by the Florida Citrus Commission to advertise and promote Florida citrus abroad. (Assessments accruing from exports since the 1952 season exceed 390,000 dollars, and for this season to date 146,000 dollars; the sum of 108,000 is authorized for the 1956-57 fiscal year).

5. Intensification of our efforts to get the British Government to allow larger imports of canned grapefruit exports.

6. Press for continued negotiations to get Denmark and Norway to purchase fruit and fruit products under the Agricultural Trade Development Act.

7. Investigate possibilities of securing foreign counterpart funds generated under our currency convertibility laws for citrus advertising and promotion work to supplement the Commission's activities.

8. Research for new foreign outlets for citrus products, like soft-drink and confectionery manufacturers.

9. Securing greater participation of Florida citrus products in International Fairs.

10. Encouraging industry efforts to improve the quality of fresh citrus at its destination.

11. Investigate the possible new outlets for dispensers in foreign countries.

12. Arranging a shipping pool of fresh grapefruit on consignment, with an initial goal of 100,000 boxes.

One activity we cannot over-emphasize is the importance of research — research into foreign consumer preferences, likes and dislikes, research on the most efficient methods of promotion, publicity and display, research into finding the most effective means of getting foreign countries to lower trade barriers and tariffs and currency restrictions, research into improving out-turns of fresh citrus in overseas countries.

In this work, attention to details is of paramount importance. It has been discovered for example, that citrus juice packed under a red or yellow label is more saleable than one bearing a light blue background because blue is still symptomatic or poison over there; that Europeans are suspicious of citrus products under labels that do not have English wording as they consider this a seal of good reliable quality; that orange juice without the picture of a half piece of fruit beside a glass of juice is only accepted after many misgivings as the actual contents; that one reason for the switch-over from cartons to half boxes for our fresh fruit was the end use for these boxes, which are collected and assembled

(Continued on next page)

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Florida State Horticultural Society To Hold Annual Meet, Nov. 7-9

Dr. Ernest L. Spencer, Secretary, has announced that the 1956 Annual Meeting of the Florida State Horticultural Society will be held on November 7-9 at the Angebilt and San Juan hotels in Orlando.

The officers and committees of the Society are now at work on a program



DR. ERNEST L. SPENCER
SECRETARY OF THE SOCIETY

which will feature many of the top State and National horticultural workers in papers and discussions of vital importance to horticulturists of the State.

It is also announced that the thirty-year Combined Index to the proceedings of the Society will be on sale by October 1. Copies may be obtained from the Secretary at a cost of \$2.00 per volume if paid prior to the annual meeting.

Present officers of the Society, all of them prominent in the horticultural field, are:

R. A. Carlton, President, West Palm Beach;

Dr. Ernest L. Spencer, Secretary, Bradenton;

R. R. Reed, Treasurer, Tampa;

Ralph P. Thompson, Publication Secretary, Winter Haven;

W. L. Tait, Editing Secretary, Winter Haven.

Sectional Vice-Presidents are:

C. A. Root, Citrus, Winter Haven;
Louis F. Rauth, Vegetable, Delray Beach;

Roy O. Nelson, Krome Memorial, South Miami;

Dr. T. J. Sheehan, Ornamental,

Gainesville;

Dr. R. D. Gerwe, Processing, Lakeland.

Members at Large are:

Howard A. Thulberry, Lake Wales;
Frank L. Holland, Winter Haven;
Dr. F. S. Jamison, Gainesville;
J. Arthur Lewis, Miami;
E. S. Reasoner, Bradenton.

With this array of leading horticulturists in charge, it may be confidently anticipated that the coming Annual Meeting will be one of great interest and vital importance to the horticultural interests of the State.

The complete program will be printed in the October issue of The Citrus Industry.

"REACHING NEW HORIZONS FOR FLORIDA CITRUS"

(Continued from preceding page)

after the original contents are out and re-used for packing and shipping vegetables from German growing areas to the major marketing centers.

It is our firm belief that with your support, and all other segments of

this great industry working harmoniously in backing Mutual's efforts to consolidate and broaden the scope of our export activities, the citrus grower of this state has a bright horizon in foreign fields. But, and we repeat, it is only realizable through undivided whole-hearted industry cooperation and we sincerely hope that wherever your influence can be applied to achieve this goal, you will do so—for the benefit of all grower members of Florida Citrus Mutual.

**NEW INSECTICIDE
SOON AVAILABLE**

A new chemical insecticide that will allow a plant to repel insect attack will be available in limited quantities for late Summer sales.

F. W. Hatch, Shell Chemical Corporation's Manager of agricultural chemical sales, described the product as an organic phosphate . . . trade-named Phosdrin. It was discovered by Shell Development Company and given experimental label acceptance by the Department of Agriculture for use against insects attacking certain fruit and vegetable crops, he said.

Phosdrin invades a plant's system, giving the plant its own built-in defense against insects. It will kill insects that either tap into the treated plant or come in contact with the insecticide. In field experiments, Phosdrin has proved lethal to insects that have developed a tolerance for certain older insecticides.

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Reports Of Our Field Men . . .

HIGHLANDS AND POLK COUNTIES

J. K. Enzor, Jr., & R. E. Lassiter, Jr.

We would like to digress a little this month on the usual Lyonizer Report and say something about two great problems facing the citrus industry at this time.

Many people have had quite a bit to say about the Medfly and we have heard in several places the remark made that this fly has been present in the state since 1929. Of course, we cannot speak for what happened in 1929 but we have seen the fruit fly in the earlier stages of this infestation in Miami along with some of the fly's work. If everyone could see an infestation as was present in Miami earlier it would be hard for anyone to say that we have had the fly over the past 27 years without having it show up in our citrus industry. It is a fact that other citrus producing countries which have this pest do not grow late maturing oranges such as our Valencias in commercial quantities, and the reason they are not grown is the Mediterranean fruit fly.

We have recently completed in this county a court hearing concerning the other great problem of the citrus industry which is — Spreading Decline. Anyone who read Judge Register's opinion as to the state's right to carry out its containment program has a good idea of the problem and what is involved. While the program set up by the State Plant Board seems rather harsh in some cases, there is no doubt but what this program must be carried through if the citrus industry is to be maintained in this part of the state. It is our opinion that even in the few cases of hardship most of these people will be better off in the long run.

SOUTH HILLSBOROUGH AND MANATEE COUNTIES

J. D. Toll

Returning from vacation I found that in some sections the groves had sufficient moisture, and other areas were still dry. However, it appears that the overall moisture condition is better at this time

(August 15th), than it has been in many months.

The late Spring growth is well developed and trees have an excellent color. Groves that had a late bloom have set a good percentage of the fruit. It is time to begin thinking about the Fall application of fertilizer on your grove.

Vegetable growers have prepared their seed beds and some have already planted the Fall crop, but the biggest plantings are expected to begin the middle of September.

As a grower of fruit or vegetables you expect quality in fertilizer and good service from its manufacturer. You get these qualities from Lyons.

SOUTH POLK, HIGHLANDS, HARDEE, DESOTO AND SARASOTA COUNTIES

C. R. Wingfield

Having just returned from a short vacation today (August 20), I find this section still hot and dry. There is, however, some evidence that there has been some showers but certainly not enough rain to make any real change in the moisture situation. When returning home I came through the central part of the State and could see signs of recent rains, mostly showers, in Marion, Lake and northern Polk counties, but as I came further south I found less signs.

The fruit crop seems to be very good in early and mid-season fruit with Valencias being some lighter. Young Valencia trees coming into bearing can have some bearing on volume however. While the fruit has up to this time sized very well there is no doubt the moisture conditions will have an effect on the size.

Spraying has been almost continuous because of the various insect infestations. Watch carefully and call our representatives if we can be of service to you. Some chopping is being done but to insure next year's cover crop let it stand out now before cutting.

The fruit buyers have been active in this section and a good many of the crops have been sold, either in a bulk or a box deal.

WEST HILLSBOROUGH AND PINELLAS COUNTIES

J. A. Hoffman

Rain is still the main conversation throughout this section, although there has been several good showers the past month. Lakes and ponds are very low, in fact they haven't come up hardly any from rain so far this Summer and everyone is concerned about going into the Fall with such a low water table.

Vacation time is about over for most growers as it is time to start running cover crop choppers, and hoe young trees and fertilize for the last time this Summer.

Rust mite has been very active and a close watch should be kept so as they can be controlled before too much damage is done.

The new crop is growing good and looks to be heavier than first expected. There was some late bloom, but nothing compared to last year.

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**Uncle Bill Says:**

These here so-called experts has been forecastin' like mad the past several months . . . some of 'em claims that the country is on the verge of an economic collapse . . . but by far the most of 'em has been saying that the balance of this year and so fur as they can see ahead into next year is goin' to keep on boomin' like nobody's business.

Personally we ain't makin' no claims whatever to bein' a expert . . . but fer what it's worth they ain't no reason we can see of thinking that business is goin' to suffer any collapse any time soon, cause unworthy as our personal opinion may be, they ain't nothin' that looks like it kin stop us from eatin' high on the hog fer quite a spell to come . . . and a lot of smarter folks than us claims that they ain't never goin' to be another bust like some we've seen in the past. These fellers give a lot of purty sound reasons, it seems to us to back up their statements.

If they ain't no other reason fer thinkin' the year ahead of us is goin' to be a good one we'd suggest you all jist look back over history and see if you kin find an election year when this country was at peace when we had bad times . . . so fer as we can remember election years has always been purty good years.

Anyhow in spite of all our troubles past and present us folks who are growin' fruits and vegetables in this country is in one of the best of all businesses fer our money.

Then there is another thing to consider . . . Florida is one of the fastest growin' states in the nation . . . more folks and more money is comin' into Florida right now than has ever come before . . . land values are climbing like crazy and even completely out of sight of the Gold Coast of our state, houses and people are springin' up all over the place.

Bein' a Florida grower and livin' in this state is a mighty fine thing. They ain't no better place or better business.

Half A Century Of Citrus Products Research

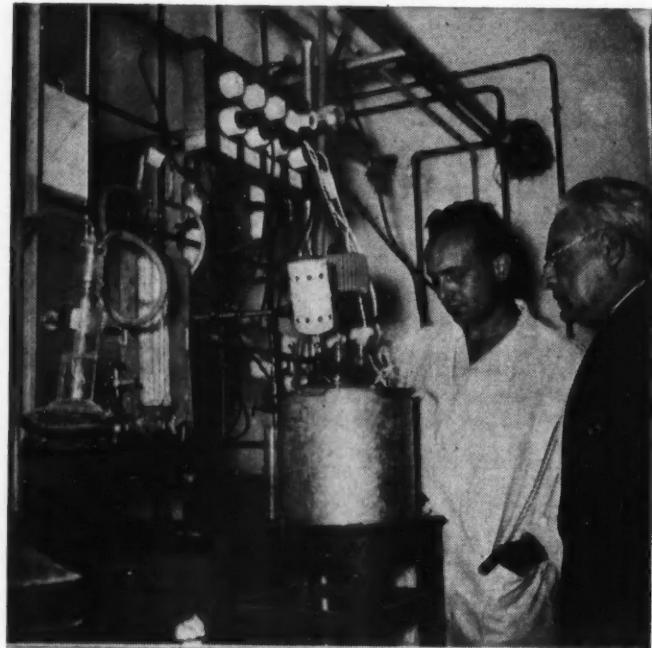
(Retrospect and Perspectives)

By J. B. S. Braverman,
(Division of Food-and Bio-Technology, Technion, Israel Institute of Technology, Haifa.)

By contrast with many other fruit products, such as wines, cider etc., which have been known since ancient times, citrus products are of only recent development. In fact, apart from very crude, and mainly primitive, early methods used during the last century in Italy and France for the manufacture of citrate of lime and essential oils, one could begin with the history of this industry almost exactly at the onset of the present century.

The first plant for the utilization of citrus fruit as a raw material on an industrial scale was erected in the U. S. A. at National City, near San Diego in 1899. However, in spite of the comparative shortness of the period one can probably differentiate between three distinct periods within this half century; the Chemical, the Bio-chemical, and the Physical; this division being of cause quite arbitrary and for the purpose of this review.

During this first phase few new facts were discovered in the field. Instead, principles known from much earlier were applied to this new raw material comprising, as it does, various species of citrus fruit. The methods for utilizing the fruit were mainly chemical in nature. Thus, in Sicily, the cradle of the Citrus-Products Industry, citrate of lime was produced from lemons by the old and well known Shelley Method, and many new procedures for the direct crystallization of the acid were tried out unsuccessfully. In Calabria, orange peels were hand-pressed solely for the purpose of obtaining essential oils, while the whole flesh of the orange with its attendant juice and pulp was discarded as waste. Only feeble attempts were made to preserve orange and lemon juices for use as beverages, by means of chemical preservatives. Sulfur Dioxide was used for the English market and salicylic and formic acids for the



DR. J. BRAVERMAN
AT WORK IN LABORATORY

German. Some of us still remember well the first articles which appeared in the California Citrograph and other important journals seriously suggesting the utilization of culled oranges for the manufacture of Acetone, Acetic Acid and other chemicals. There were even suggestions for using them for roads, and for making coffins.

The Biochemical Period

The great strides made in our general knowledge of biochemistry during the Twenties had their marked effect also on the citrus products industry. Widespread and fundamental researches on Vitamin C on the constitution of pectic substances, etc., greatly broadened our understanding of the biochemical changes taking place in the fruit tissues after cell disruption. At about the same time there was considerable expansion in the use of aluminium and stainless steel throughout the processing plants. Both these tendencies profoundly influenced applied research in this industry and such methods as aeration, flesh pasteurization, and enzyme inactivation rapidly became

common knowledge and their application more or less worldwide. New principles were applied and new methods developed—from then on juices were successfully heat-treated and canned, while the residue was treated in various ways for the production of dry pectins, cattle fodder, molasses, and many other products. Citric acid was now produced by mycological methods from sugar-containing material much more economically than from lemons.

The Physical Period

Thus we quickly entered the third phase, that which attempts were made to apply every conceivable principle of Physics to a rapidly developing industry. World War II gave an impetus to the rapid development of vacuum concentration in various forms. Lyophilic drying or sublimation from the frozen state was experimented with extensively, though never reaching commercial dimensions. High vacuum and low temperature concentration, coupled with the so-called "cut-back" with natural juice, was responsible for the universally known Frozen Concentrates, which showed

during the last ten years a phenomenal development such as no other food product has ever achieved. Ways and means are now being sought for producing dry orange powder (better known as "crystals") and finally much has already been achieved in the way of preserving, by irradiation with cathode and gamma rays.

Every imaginable method has been tried with our raw material even the Vitamin B-12 was prepared by fermenting peel affluents, and the latest "craze" is probably the bioflavonoids, which took quite an ecliptic course, starting with vitamin P and continuing through a list of various pharmaceuticals, first as anti-conception drugs in their phosphorylated form and more recently as replacements for antihistaminic remedies.

As with the first period, the Physical was again one in which mainly known facts were applied, a rather empirical age, in which I dare say no new principles were discovered.

Where do we stand now? and whither are we drifting?

Notwithstanding all this phenomenal development within so short a time, there is much still to be desired as far as quality, technology, for instance, the question of aroma and flavour. Negative results were achieved by stripping orange juice, by contrast to that which has been successfully managed with apples. Unsatisfactory results were obtained even by evaporation from the frozen state, for no matter how low we bring down the temperature of evaporation, the volatile constituents will always evaporate before the water. On top of this, the specific and very elusive freshness of the newly-expressed juice is lost in every case. We also know too little about the various bioflavonoids in the juices which apparently play the most important role in that intricate complexity called flavour.

Or again, consider the question of appearance: we know now that biochemical problems, such as sedimentation of the pulp or the permanent cloud stability of the juices, which were thought of as resolved, are very far from being completely understood and there is much more which is obscure than which is apparent. It seems that inactivation of Pectin Esterase (PE) is not the whole story and we realize regretfully that, while sterilization alone merely requires a few seconds at a lower temperature than the comparatively longer process of enzyme inactivation, our efforts to shorten the length of heat treatment in order to preserve the aroma are thus frustrated.

It is obvious now that we cannot

advance much further until we learn more about the nature of our raw materials, try and discover new principles and learn to apply them successfully to our industry. For all the excellent physical methods which we already apply, do not give us complete satisfaction, not even the "Columbus Egg", which was invented by the Americans and which consists in restoring a part of the natural aroma in the form of a "cut-back". Neither this nor the recently investigated irradiation procedures give acceptable results.

On the theoretical side I believe, therefore, that we must get to know more about the part played by the so-called secondary products, their behaviour and their biochemical action: the glucosides, the essential oils, the pectic substance and so forth. The exact position of ascorbic acid needs further elucidation what are the factors which so greatly influence vitamin C in different varieties of the Mesperides and why do there occur tremendous fluctuations even in the same variety from time to time and place to place.

We should not abandon altogether old ideas about chemical preservation. There is a lot more in them than meets the eye, for we know from recent investigations, for instance, that minute quantities of SO₂ would be sufficient were it not for its combining with certain sugars.

In this direction it is important also to learn more about the nature of synergistic action; for instance, about combinations of heat treatment with chemicals, or with certain antibiotics, or even with sonic and ultrasonic radiation, might give better results than when applied singly.

A deeper knowledge is required of the browning reaction in citrus juices, especially in view of the existing differences between orange concentrates and those of grapefruit and lemon, where even additions of SO₂ do not prevent browning.

On the technological side I believe it is necessary, first and foremost, to find an economic solution for the concentration of citrus juices by the application of cold, i.e., the freezing out of water. Many attempts in this direction have already been made, but so far the calory is cheaper in practice than the frigory, although theoretically in our case it should be more attractive. Freezing out one liter of water requires only 80 calories as against 560 necessary for the evaporation of the same quantity.

There is a saying among the leaders of the Citrus Industry in California and Florida that more of the

valuable components of the citrus fruit leave the plant by the back door than those that find their way to the consumer. As an example, more of the ascorbic acid which is found in threefold amounts in the albedo as compared with the juice, should find its way back to the juice somehow. The time has come when the industry has to put a stop to such leakage and others by serious research, the aim of which should be to tackle the problems at the heart.

PREVENTING PLANTING LOSSES IN CITRUS TREES

(Continued from page 12)

two to take the place of a watering, when actually the tree is getting only a fraction of the moisture needed. Also there occur during the Summer many extremely hot, dry days that dessicate new growth in spite of frequent waterings.

If a grower has a site in a warm location with good air drainage where the danger of a killing freeze is at a minimum, he can well consider planting in November through February. Usually the procedure in such planting is to plant with water, water again in 2 or 3 days and bank with clean soil. Unless an extremely dry Winter occurs, the banks can be left up until March 10 or thereabouts when they are removed and trees are watered. Should the season be dry, it may be necessary to unbank to water and then re-bank immediately. Plantings made after February 15 are usually made without banking. But frequent waterings then become necessary. We recommend either of these periods according to the location and characteristics of the planting site. Care should be taken against planting during or immediately after the spring flush of growth as it seems the tree has little reserve of plant food built up and becomes extremely susceptible to damage by lack of moisture.

One final word of caution—guage the amount and frequency of watering by the size of the tree. The larger the tree the more water needed since the tree has lost a greater percentage of its root system in digging. For best results we recommend a 5/8" to 7/8" caliper tree.

By observing these precautions, tree planting losses can be held to a minimum, probably not to exceed 3%. There is no doubt that the cheapest insurance against loss is adequate and frequent waterings. It makes good sense to protect your tree investment of \$1.75 or more with a 5c watering.

The "Gold" In Citrus

On that day in 1818 when the first orange grove was planted in America on Merritts Island, little did the planter know how important oranges would become in the lives of people of our time. Neither did Count Odet Phillips know how important the grapefruit would become when he planted the first grove 112 years ago in Pinellas County.

There seems to be no end to the new important discoveries found in citrus. The golden oranges, lemons and grapefruit seems synonymous with Spanish treasures of old. This is almost true today, for almost every day the scientists are finding "gold" in citrus, by coming up with new names and uses for citrus by-products.

The latest find was introduced in a report to the 129th national meeting of American Chemical Society in Dallas, Texas. The compound consists of water soluble bio-flavonoids, which have definite anti-inflammatory activity. This paves the way for further research in conditions of inflammatory arthritis, bursitis, and cystitis.

Golden magic is coming from this golden fruit in the laboratories of the U. S. Dept. of Agriculture, and the citrus marketing cooperatives. The oleomargarine you eat, and the soap you use, may have started in your Florida orange grove. Printing ink, tree spray, sponge rubber, musilage, quick healing powders of low-methoxyl pectic, and the water-soluble Bio Flavonoids plus vitamin C which makes it possible for many once thought sterile to bear children—all have their inception in a citrus grove.

The golden fruit itself as viewed by chemists consists of the bright-colored ring and with pulp just below forming the peel. This gives abundantly in oil, pectin, wax and flavonoid (dye substance). Below the peel are juicy sections, full of acids, vitamins, sugars; also more oils, pectin and flavonoids. These materials taken apart, re-hashed, or modified, take on forms that keep doctors, farmers, perfumers, biologists and technologists in a dither of excitement.

In Florida alone think of the mountain of peel, pulp and seeds that are left after the citrus enters the automatic extractors. The S. S. Tropicana leaves Port Canaveral regularly carrying 1,000,000 gallons of orange juice to New York City. First use of the rind and pulp was to make

By George Strickland

it into marmalades—a health giving food. It was early discovered that the peel was an aid to TB patients. Later dried citrus pulp was fed to cattle successfully. Orange oil for flavoring cakes, pies, candy and cold drinks came on the heels. Then came molasses, seed oils, alcohol, citrus acid, yeast, etc.

Pectin was discovered, and found it would dissolve in distilled warm water, and while not as good as plasma, could pinch-hit on the battle-fields. Pectin was found helpful in killing germs and aiding in the growth of new healthy tissues in the body. It also controls dysentery and diarrhea in infants. At present, pectin pastes and solutions quickly heal many types of sores and wounds—including ulcers, burns, compound fractures and some types of colitis; and speeding clotting in some bleeding disorders. Another kind of pectin was discovered which would jell liquids that contained little, or no sugar. Thus making new products such as canned vegetable salads, low sugar jelled fruit desserts, gelatin-like milk puddings and jellied consomme.

Recent discoveries that has sparked interest in the medical field is the flavonoids (substances that give citrus peel its beautiful colors), and more especially the bio-flavonoids mentioned above at the American Chemical Society in Dallas, Texas. This last one is being readied for the fight against inflammatory arthritis, bursitis and cystitis. Many of us have long been familiar with vitamin C in citrus fruits which prevents scurvy. Scientists have known that something else worked with vitamin C to prevent scorbutic bleeding. In using lemon juice they finally ran down the unknown chemical, and found it to be lemon flavonoid complex, citrin. They renamed citrin vitamin P for "permeability" because it appeared to make capillary walls stronger and kept blood from oozing into surrounding tissue.

Medics readily found that when vitamin C plus these water-soluble orange peel, bio-flavonoids were given along with the new vitamin P better results were obtained. Cancer patients made to take X-ray treatments have been treated with

the bio-flavonoids to withstand stronger doses and minimize damage to the tissue area around the tumor.

Water-soluble bio-flavonoids plus vitamin C figure in new important studies by making it possible to reduce blood clotting when using drugs. So new hope is expected for victims of embolism, infarction and rheumatic diseases. Yes! The Florida orange and grapefruit, and the lemon have come a long way—and there's still "Gold in 'em"!

"Chilled Orange Juice" Called New "Plus" Market For Florida Fruit

Chilled orange juice, a comparative new product, will require 1,500,000 more boxes of oranges this season than last and is "an important 'plus' market helping to increase over-all demand for oranges substantially," Florida Citrus Mutual said recently.

Mutual estimates that the chilled juice outlet will use approximately 6,500,000 boxes of oranges from the 1955-56 crop, compared with 4,900,000 boxes from the 1954-55 crop.

Chilled orange juice is sold full strength and marketed principally in waxed paper cartons similar to those for fresh milk. Although a comparative newcomer in the Florida citrus industry, it has become "big business" and many of the nation's largest food distributors are handling the product.

Mutual said close to 4,500,000 gallons of frozen orange concentrate would be used during the Summer months to make chilled juice, when fresh oranges are available only in limited volume.

Classified Ads

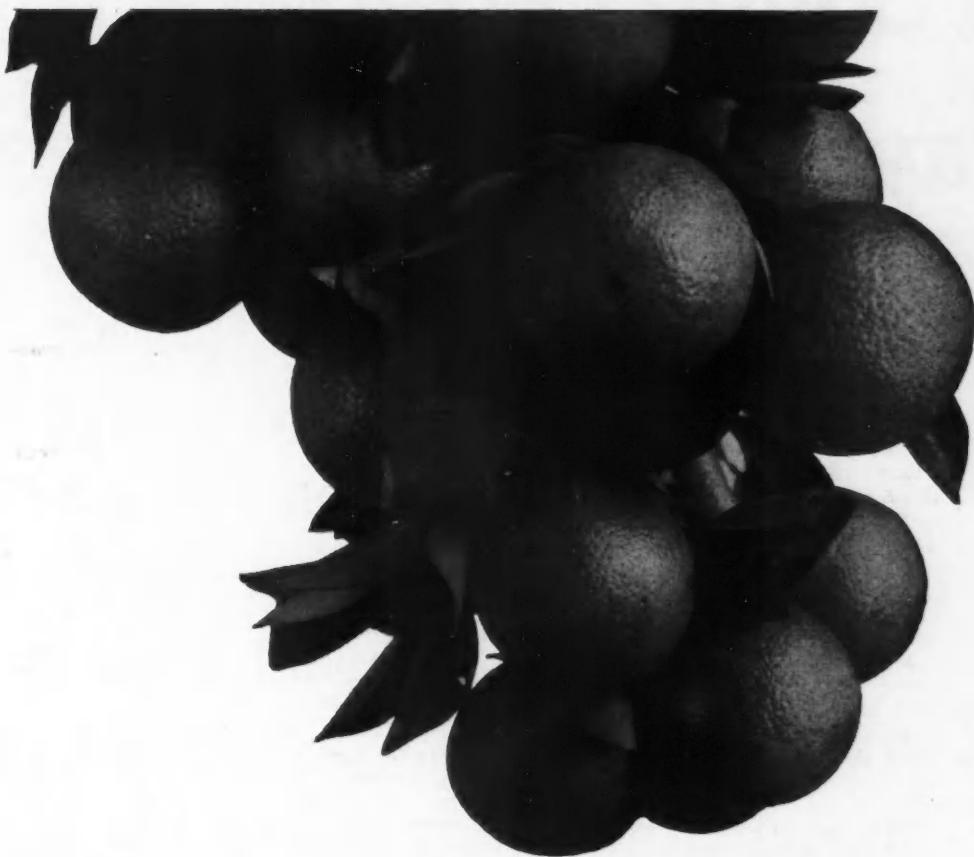
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Extensive usage has proved Aramite gives effective immediate and residual control of Purple Mite (Citrus Red Mite) and Six-Spotted Mite on citrus. Recommended by the Florida Agricultural Experiment Station. Aramite

is effective against mite adults and nymphs—immediately stops feeding of adults and young and kills within 72 hours. Field usage has definitely established Aramite-Sulfur compatibility—whether Aramite is tank-mixed with wettable sulfur or field-sprayed before or after sulfur dusting or spraying. Safe on citrus, leaves no harmful residue, is non-hazardous to handlers and does not kill off beneficial insects.

Order Aramite from your local supplier today. Write, wire or phone us if unable to locate immediate source of supply.

SEE — Naugatuck Chemical Division, United States Rubber Company, at work on NBC's "Color Spread" TV spectacular, Sunday, March 25, 7:30 PM, EST.



United States Rubber

Naugatuck Chemical Division

Naugatuck, Connecticut

producers of seed protectants, fungicides, miticides, insecticides, growth retardants, herbicides: Spergon, Phygon, Aramite, Synklor, MH, Alanap, Duraset.

A Sound Fertilizer Program Pays Off In Added Earnings

The diet which you provide for your trees determines to a large extent the magnitude and quality of the crop you produce... when this diet provides the plant food your trees require it is reflected not only in the crops you produce but in the money you receive for your crop.

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